



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE

United States Patent and Trademark Office

Address: COMMISSIONER FOR PATENTS

P.O. Box 1450

Alexandria, Virginia 22313-1450

www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/026,286	12/20/2001	Yoshiaki Mori	P6495a	1796
20178 7590 06/16/2008 EPSON RESEARCH AND DEVELOPMENT INC INTELLECTUAL PROPERTY DEPT 2580 ORCHARD PARKWAY, SUITE 225 SAN JOSE, CA 95131				
EXAMINER				
CHACKO DAVIS, DABORAH				
ART UNIT		PAPER NUMBER		
1795				
MAIL DATE		DELIVERY MODE		
06/16/2008		PAPER		

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

### Office Action Summary

**Application No.**

10/026,286

**Applicant(s)**

MORI ET AL.

**Examiner**

DABORAH CHACKO DAVIS

**Art Unit**

1795

**Period for Reply** -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 24 March 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-22 and 65-69 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-22 and 65-69 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-8508)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-22, and 65-66, are rejected under 35 U.S.C. 102(b) as being anticipated by EP 0630044 (Okumura et al., hereinafter referred to as Okumura).

Okumura, in the abstract, in col 2, lines 24-57, in col 3, lines 14-58, in col 4, lines 1-56, discloses a pattern forming method of forming a mask having pattern forming openings (photolithographically formed photoresist pattern, reference 43, of figures 4A through 4D), filling the substrate with openings to a predetermined solution to fill the opening with the material (solidified liquid pattern material, drying the liquid solution adhered onto the opening so as to form a layer in the opening, the SOG layer or SiO<sub>2</sub> layer is solidified (SOG layer formed by a spin on coating, palladium layer (electrically conductive layer) formed in the openings), removing by etching the material adhered onto portions of the surface of the photoresist mask (not the material formed in the opening), performing a hydrophobic treatment (photoresist mask is also made hydrophobic), performing a baking treatment, immersing the substrate again to form another layer of the material in the openings (plural pattern material supply process, solidifying the material to form a layer, forming another solid glass layer), performing a

Art Unit: 1795

photoresist mask removal process by ashing (including annealing, i.e., mask removal and annealing is performed simultaneously). Okumura, in col 4, lines 44-53, discloses immersing substrate with a mask i.e., a photoresist mask that has pattern forming opening (unmasked portions are the pattern forming openings), and immersing the substrate with the mask into a solution of palladium chloride to form a palladium layer i.e., solution of palladium chloride is applied on to the mask formed side of the substrate such that palladium layer is formed on the surface of the mask and the unmasked portions; the layer formed is no longer a solution, the process of forming the palladium layer inherently included a drying process since the layer formed is not a liquid and since the layer is not a palladium chloride solution, it is a solidified layer. The substrate (that was immersed in palladium chloride layer to form palladium layer) is then subjected to plasma ashing to remove the mask portions, ashing process itself raises the temperature of the substrate i.e., it undergoes annealing. Okumura, in col 4, lines 35-53, discloses performing plural times pattern material supply process, adherent liquid process, as discussed in paragraph A) of section 5, and drying process i.e., a palladium layer is formed in the openings of the mask, and dried, and no adherent material is left behind on the mask, followed by a pattern material supply process of nickel that is formed in the openings of the mask, and dried. After all theses processes, an ashing step is performed that subjects the substrate and all the layers therein to a higher temperature i.e., it is annealed. Okumura, in col 2, lines 42-46, and in col 4, lines 34-56, discloses that photoresist pattern mask is hydrophobicized prior to forming the liquid material in the openings, and the removal process of material attempting to adhere on

Art Unit: 1795

the mask surface is accomplished due to the imparted hydrophobicity (i.e., the surface of the photoresist mask will repel or dissipate in the solution or while removed the liquid material attempting to and/or adhered to the mask surface (while being immersed or removed out of the solution for further processing) (claims 1-22).

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 67-69 rejected under 35 U.S.C. 103(a) as being unpatentable over EP 0630044 (Okumura et al., hereinafter referred to as Okumura) in view of U. S. Patent No. 6,669,683 (Santini, Jr. et al., hereinafter referred to as Santini).

Okumura is discussed in paragraph no. 2.

The difference between the claims and Okumura is that Okumura does not disclose filling the pattern openings of the mask with the conductive material without submerging the workpiece in the liquid material. Okumura does not disclose that the conductive material is provided via a specific volume-discharge such as a inkjet print head (claims 67-69).

Santini, in col 12, lines 58-67, in col 13, lines 1-14, discloses the method of filling pattern openings with material using an inkjet printer.

Therefore, it would be obvious to a skilled artisan to modify Okumura's method of filling the conducting material in the openings by employing the method of using an

inkjet printer to fill the openings with the liquid material as taught by Santini because Santini, in col 11, lines 5-7, discloses that using the inkjet printer enables the filling of the opening without much processing steps i.e., avoiding multi steps of CMP or other planarizing methods.

### ***Response to Arguments***

5. Applicant's arguments filed March 24, 2008, have been fully considered but they are not persuasive. The 102 rejection made in the previous office action (paper no. 20061014, and examiner's action) has been maintained.

A) Applicants argue that Examiner is making official notice of the equivalence of electroless plating of a surface submerged in a solution is equivalent to solidifying the solution.

The Examiner's answer and the action written is not an official notice, and relies on the reference's teaching i.e., what the reference teaches is within the scope of what is being claimed. The process i.e., how the liquid pattern material is solidified in the openings, or what type (other than the pattern material formed being conductive) of liquid pattern material is applied in the pattern forming openings or what type of filling process is not recited in all the claims (except for claim 69). Okumura discloses immersing a substrate with a resist mask formed on it (and has pattern forming openings) into a palladium chloride solution and forming in the openings a palladium layer. A palladium layer formed in the openings is solidified, not a liquid.

***Conclusion***

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Daborah Chacko-Davis whose telephone number is (571) 272-1380. The examiner can normally be reached on M-F 9:30 - 6:00. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark F Huff can be reached on (571) 272-1385. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

dcd

/Daborah Chacko-Davis/

Examiner, Art Unit 1795

June 9, 2008.